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ABSTRACT

An experimental design which allowed for the random assignment of students to teacher on the basis of sex enabled the authors of this study to answer the questions: (1) Do boys or girls have higher achievement with male or female teachers?; (2) Do boys or girls evaluate male or female teachers more positively?; The student sample was randomly drawn from the population at a midwestern suburban high school and the teacher sample consisted of teacher trainees at a large midwestern university. The study did not find that either teacher sex or student sex correlated with student achievement or student rating of teachers in any consistent way. The authors conclude that the absence of evidence of consistent teacher/student sex interaction is encouraging and suggests an investigation of other variables such as teacher skills regardless of teacher sex. (Author/SES)

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The Influence of Sex of Student and Sex of Teacher on Students' Achievement and Evaluation of the Teacher

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Is student achievement affected by the teacher's sex or the student's sex, or the interaction of the student's sex with the teacher's sex? Second, are student evaluations of teachers influenced by student sex or teacher sex or the interaction of the two? Much research has been conducted to answer elements of these questions. The results of those studies are inconclusive.

Research regarding achievement and the interaction of students' and teachers' sex has been conducted to explain the observation that girls are higher achievers than boys in elementary school. The predominance of female teachers in the primary grades has provided a tempting explanation for this disparity in achievement. A much cited cross-cultural study of reading achievement by Preston (1962), showed that American girls were better readers than American boys, although German boys were better readers than German girls. This finding, coupled with the fact that most teachers in German primary grades are male, led to the conclusion that same-sex pairing of teacher and student led to optimum learning conditions.

Contradictory evidence has also been found. Bennet (1962) compared the achievement growth of fifth grade students having male teachers with those having female teachers. He found that female teachers' pupils showed greater overall achievement than male teachers' pupils and that female pupils showed more academic growth than male pupils. Academic growth was not affected by sex of teacher.

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A study by Peterson (1972), designed to determine the effects of the sex of a teacher-experimenter upon learning, used a paired associate task as representative of learning to read sight words. Twelve teacher-experimenters gave individual instruction to first and fifth grade children. The girls scored significantly higher than boys by grade level, but teacher sex per se did not affect achievement.

The previous studies have used student achievement as measured by standardized test scores as the dependent variable. Some research has used teacher grades as the dependent measure of student achievement. In 1909 Ayres suggested that female teachers tend to grade girls higher than boys. More recently there is evidence that male teachers assign higher grades to students regardless of sex than do female teachers (Arnold, 1968).

McKeachie and Lin (1971), studying the influence on achievement of the teacher/student-sex interaction and teacher warmth, were also concerned with the differential treatment of boys and girls by male and female teachers. Since their previous studies suggested that "warm" female instructors tended to give higher grades than less warm instructors of either sex, objective test scores were used to assess the effect of teacher warmth on student achievement. They concluded that the higher grades given by "warm" female instructors were justified in terms of the teachers' greater effectiveness, since their students actually had higher achievement scores.

The previous study adds another interesting dimension to the problem by investigating student ratings of teachers as related to teacher/student-sex interaction and subsequent achievement. McKeachie and Lin (1971) used one- and three-item student ratings of teacher warmth and found that for male teachers, high teacher warmth is associated with relatively high achievement for female students, but not for male students. For female instructors, high teacher warmth was more effective than low teacher warmth for students of both sexes. This difference was interpreted to mean that high achieving female students are anxious about achieving success which may lead to unpopularity and loss of femininity. A warm male teacher who is friendly and encourages success may reduce one of the factors inhibiting female achievement.

Heath (1968), interested in student's perceptions of teacher characteristics, obtained ratings by 75 high school students on different teachers using Osgood's Semantic Differential. The teacher ratings by female and male students were significantly correlated with each other on the dimensions of teacher potency and activity, and not correlated with respect to the evaluative dimension. When subjects were grouped into three levels of ability, there were significant differences in perceptions of teachers on all of these dimensions.

Wharton (1968) obtained ratings of 27 teachers from 245 high school seniors to study the relationship between student characteristics and student ratings of teachers' effectiveness. In an analysis for each teacher, variables such as student sex, I.Q., grade-point average, course grade, and personal acquaintance with the teacher were not consistently related to student rating of the teacher. The only consistent positive correlations

were obtained between student ratings of teachers and student ratings of the course.

In educational studies involving the relation of student and teacher sex, differences in findings may be related to variations in the subject matter taught, differences in measurement of achievement (e.g., objective scores, teacher's marks), differences in teacher's skill, and differences in rating scales.

An experimental design allowing for the random assignment of students to teachers on the basis of sex, controlling for a number of situational variables, has been developed. This design allows us to answer two questions: (1) Do boys or girls have higher achievement with male or female teachers? (2) Do boys or girls evaluate male or female teachers more positively?

Methodology

Data were collected on three separate occasions. The student sample on each occasion was randomly drawn from the population of a midwestern suburban high school. The teacher sample consisted of teacher trainees at a large midwestern university. Each teacher taught one short course specially designed for this study.

In the first administration, 170 high school students were randomly assigned to English classes; there were approximately equal numbers of males and females. Similarly, 164 students were randomly assigned to Social Studies classes. The classes met an hour a day for two weeks. Each class had approximately fifteen students. Twenty first-year teacher trainees, ten in English and ten in Social Studies, were randomly assigned

to teach the course in their subject area. Thus, students and teachers were randomly assigned to classes.

In the second administration, students were randomly assigned in the same manner to five courses as follows: 343 and 239 to each of two Social Studies courses, 433 to English, 179 to Math, and 188 to Science. Similarly, 86 first-year teacher trainees were randomly assigned to teach courses as follows: 21 and 18, to each of two Social Studies courses, 25 to English, 11 to Math and 11 to Science.

The same procedures as used in the previous administration were applied to the third administration, with 249 and 283 students assigned to each of two Social Studies courses, 463 to English, 158 to Math, and 174 to Science. Eighty-one first-year teacher trainees were assigned as follows: 15 and 17, to each of two Social Studies courses, 28 to English, 10 to Math and 11 to Science. In the second and third administrations, classes met one hour a day for one week; each class had approximately twenty students.

The courses used in the first administration were Social Studies and English topics titled respectively "The 1920's" and "Communications". Both were courses similar to those found in a typical high school curriculum and were developed by experienced high school teachers. For the second and third administrations, the student body of the high school was polled and asked what courses they would be interested in taking in each of the four subject areas. Subsequently, courses were specially developed by experienced high school teachers according to their suggestions. The courses taught in the second administration were as follows: Social Studies - "Amerindian" and "Prison Reform"; English - "The Comic Book as Literature";

Math - "Finite Systems of Mathematics"; and Science - "Evolution". In the third administration the Math and Science courses were refined, though basically unchanged, and the remaining courses were as follows: Social Studies - "Alternatives to the Draft" and "Witchcraft"; English - "Science Fiction as Literature".

All teachers received special training on the content to be taught and on relevent teaching skills to be used in teaching these courses. The material given to the trainees stated the objectives to be attained, the topics to be covered, and substantive information on these topics. The developer of each course also prepared an achievement test that measured attainment of the objectives; the test was given at the end of the course. Test reliability, as measured by alpha coefficients ranged from .34 ("Evolution") to .90 ("Finite Systems of Math").

Prior to the course, all students took a verbal aptitude test. After the course, all students completed a 34-item teacher rating scale and took the achievement test. The teacher rating scale contained items that asked whether the teacher was one the student would like to have as a regular teacher, whether the teacher made the student interested in the lessons, whether the teacher encouraged class participation, and similar items. Subsequent analysis of these ratings and others obtained on other samples indicates that the scale measures general favorability toward the teacher or a "good impression" factor. Scale reliability, as measured by alpha coefficients, ranged from .90 to .95.

Analysis and Results

Achievement

A two-way analysis of variance with sex of student and sex of teacher as independent variables and achievement scores as the dependent variable was performed. Data were analyzed separately for each of the twelve courses. The significant main effects and interaction effects from these analyses are presented in Table 1.

In the first administration no significant effects were found. In three of the five courses in the second administration ("Prison Reform", "Comic Books as Literature" and "Finite Systems of Math"), female students performed better than male students on the achievement test irrespective of the sex of the teacher. In one course ("Evolution") students who had male teachers performed better than students of female teachers. Only one course (Amerindian) yielded a significant interaction effect by sex: students performed better with teachers of the same sex.

In the third administration, students of male teachers performed better than students of female teachers in the course on "Alternatives to the Draft". In the "Witchcraft" course male students performed better than female students irrespective of the sex of the teacher, while in "Comic Books as Literature" female students performed better. One course ("Evolution") showed a significant interaction effect: students performed better when taught by teachers of the opposite sex. On all three occasions most courses were taught by approximately an equal number of male and female teachers. There are some noticeable exceptions, such as "Evolution", "Witchcraft" and "Science Fiction."

Table I

Two way ANOVA Teacher Sex X Student Sex with Achievement Scores as the Dependent Variable

Significant Main Effects and Interaction Effects

First Administration	Source	df	F Ratio	Direction of Significance	N of Male Teachers	N of Female Teachers
English Course	None	-	NS	-	5	5
Social Studies	None	-	NS	-	6	4
Second Administration						
Amerindian	Teacher X Student	1,339	4.23*	Students did better with teachers of the same sex	10	11
Prison Reform	Student	1,296	14.32**	Female students did better than male students	9	9
Comic Books as Literature	Student	1,430	10.17**	" "	10	15
Finite Number Systems	Student	1,176	7.64**	" "	6	5
Evolution	Teacher	1,185	4.17*	Students of male teachers did better than students of female teachers	8	3
Third Administration						
Alternatives to the Draft	Teacher	1,246	5.35*	" "	8	7
Witchcraft	Student	1,280	5.07*	Male students did better than female students	16	1

Science Fiction as Literature	Student	1,460	4.95*	Female students did better than male students	4	24
Finite Number Systems	None	-	-	-	3	7
Evolution	Teacher X Student	1,170	7.37**	Students did better with teachers of opposite sex	9	2

* $p < .05$
** $p < .01$

Ratings

A two-way analysis of variance was performed on the students' ratings of the teachers gathered from the first, second, and third administrations; student sex and teacher sex were the independent variables, and the rating score was the dependent variable. In addition, a three-way analysis of variance was done on the same data, a separate analysis for each administration. The independent variables for this three-way analysis were teacher sex, student sex, and course topic, and rating score was the dependent variable. The significant main effects and interaction effects for the two- and three-way analyses are presented in Tables 2 and 3.

In the first administration no significant effects were found in the two-way ANOVA. In the three-way ANOVA the course main effect was significant, but the Scheffé test failed to confirm that any course was rated significantly higher than any other.

In the second administration the two-way ANOVA showed that male teachers were rated higher than female teachers in three courses ("Prison Reform", "Finite Systems of Math", "Evolution"). In the three-way ANOVA male teachers were rated higher than female teachers. There was a significant course effect, indicating that students rated teachers of certain courses differently than teachers of other courses. Sheffé tests showed that the teachers who taught the "Evolution" course were rated significantly lower than the teachers of other courses. Finally, a significant teacher by course interaction effect was found. Female teachers who taught "Prison Reform" and "Evolution" were rated lower than male teachers who taught these two courses.

Table 2

Two-way ANOVA Teacher Sex X Student Sex with Rating Score as the Dependent Variable

Significant Main Effects and Interaction Effects

	Source	df	F Ratio	Direction of Significance	N of Male Teachers	N of Female Teacher
Second Administration						
Prison Reform	Teacher	1,244	27.7914**	Male teachers rated higher than female teachers	9	9
Finite Number Systems	Teacher	1,152	11.0342**	" "	6	5
Evolution	Teacher	1,153	60.7728**	" "	8	3
Third Administration						
Alternatives to the Draft	Student	1,211	7.2535**	Male students rate higher than female students	8	7
Witchcraft	Teacher	1,248	9.7944**	Male teachers rated higher than female teachers	16	1
Evolution	Student	1,156	5.4423*	Male students rate higher than female students	9	2

$p < .05$

* $p < .01$

Table 3

Three-way ANOVA Teacher Sex X Student Sex X Course with Rating Score as the Dependent Variable

Significant Main Effects and Interaction Effects

	Source	df	F Ratio	Direction of Significance
First Administration	Courses	2,370	3.2541*	Math was rated higher than English which was rated higher than Social Studies though Scheffé test failed to confirm significant difference***
Second Administration	Teacher	1,1207	36.2856**	Male teachers rated higher than female teachers
	Courses	4,1207	15.3525**	Scheffé tests show "Evolution" rated significantly lower than other courses ($p < .01$)
	Teacher X Course	4,1198	15.0896**	Scheffé tests show female teachers teaching "Prison Reform" and "Evolution" rated lower than male teachers teaching those courses ($p < .01$)
Third Administration	Student	1,1188	8.0712**	Male students rate higher than female students
	Courses	4,1188	14.7828**	Scheffé tests show that "Evolution" was rated lower than "Witchcraft" and "Science Fiction as Literature" ($p < .01$)

* $p < .05$

** $p < .01$

*** A math course, excluded from other analyses, was included here

In the third administration, the two-way ANOVA showed that male students rated their teachers higher than did female students in two courses ("Alternatives to the Draft" and "Evolution"). In the "Witchcraft" course, male teachers were rated higher than female teachers. In the three-way ANOVA male students rated their teachers higher than did female students, and students rated teachers of certain courses differently than teachers of other courses. Sheffé tests show that teachers who taught "Evolution" were rated significantly lower than teachers who taught "Witchcraft" or "Science Fiction as Literature".

Discussion

The analyses lead to these findings:

1. Female students achieved higher than male students in four of the 12 courses; males surpassed females in only one course.
2. Contradictory evidence of teacher/student sex interaction was found. In one course ("Amerindian") students achieved better with teachers of the same sex; in another ("Evolution") students achieved better with teachers of the opposite sex.
3. Male teachers produced higher achievement than female teachers in two of the 12 courses; female teachers surpassed males in none.
4. Students rated male teachers higher than female teachers in four of the 12 courses; they rated females higher in none.
5. Male students gave higher ratings than did female students to teachers regardless of sex in two of the 12 courses; female students gave higher ratings in none.

We did not find that either teacher sex or student sex correlated with student achievement or student rating of teachers in any consistent way. From this we may infer either 1) there were methodological problems which affected the sensitivity of this design to detect differences or 2) there are no differences.

Although the design of this study provides controls over many factors which would be expected to interact with student achievement and student ratings of teachers, some methodological problems are apparent:

1. Since all courses were not taught by an equal number of male and female teachers, some comparisons regarding sex differences are difficult to make.
2. Although some control was provided regarding course content and teacher preparation, possible individual variation cannot be discounted.
3. Students did not have an opportunity to observe a male and a female teacher teaching the identical course.
4. Although achievement scores were gathered objectively, one could argue that students had little motivation to learn or score highly in the usual sense since grades did not "count".

Furthermore, there are two possible ways in which the study may not have been sensitive:

1. Other, non-measured factors may have affected student achievement and student ratings of the teacher. One such possible factor is teacher skill.

2. Ratings of teachers by students may not have been teacher ratings at all, but may have been indirect ratings of courses. The study by Wharton (1968), cited earlier, shows that course and teacher ratings are positively related.

Despite these methedological problems, this design might be expected to identify a teacher/student-sex interaction if in fact it existed. The short length of the course permitted students to know their teachers only superficially. Student judgments could be based on only very obvious distinctions, one of which is teacher sex.

The absence of evidence of a consistent teacher/student-sex interaction is encouraging. It means we can look to other variables such as teacher skills regardless of teacher sex. Effective teaching evidently depends on much more than sex congruence of teacher and pupils.